The Teaching Materials Design of North Sumatran Folktales Based on Augmented Reality

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Abstract

This research is prompted by the students' low literacy skills in inclusive education in Indonesia, especially in North Sumatra. The current government has given more attention to the implementation of inclusive education through Law Number 8 of 2016 in Article 5 paragraph 3f concerning the persons with disabilities, and Regulation of the Minister of National Education of the Republic of Indonesia Number 70 of 2009 concerning the inclusive education for students who have abnormalities and have potential intelligence and/or special talent. The purpose of this study is to explain the process of developing the augmented reality book of folktales of North Sumatra. The method used in this research is ADDIE (Analysis-Design-Develop-Implement Evaluate) model. One of the functions of ADDIE is as a guide in building training program tools and infrastructure that is effective, dynamic and supports the performance of the training itself. This model uses 5 development stages, they are analysis, design, development, implementation evaluation. This article describes the stages of preliminary study, planning, product development, and product review. The results showed that the steps taken in designing an augmented reality application included: markers on books, reading markers on books, detecting markers, displaying 3D objects and playing sound, and continuing to display 3D objects and sound explanations. Moreover, the architectural design of augmented reality applications includes AR applications.

I. Introduction

The improvement of the education quality for children with special needs is currently being carried out intensively. Permendiknas Number 70 of 2009 requires that district/city governments appoint at least one primary school, and one junior high school in each sub-district to provide inclusive education. In addition, the government of Indonesia through Law Number 8 of 2016 in Article 5 Paragraph 3f concerning the persons with disabilities mentions the equal treatment with other children to achieve social integration and individual development.

The related research concerning the education inclusive is also ongoing. Some of them are Gemma Diaz-Garolera, M. Pallisera & J. Fullana (2022) who analyzed the improvement of social skills, Chen Han & Therese M. Cumming (2022) analyzed the government policies in China for children with autism, Marie Gitschthaler, Julia Kast, Rupert Corazza & Susanne Schwab (2021) analyzed the learning in inclusive classrooms. The inclusive learning requires the support of a learning environment for students with disabilities in inclusive classes, they are classroom arrangements, visual support, translators, supporting technology, manipulative, written exposure (Ayantoye, 2016;

Schultz, et al., 2013) and Krishnan, MM (2022). To address the challenges and harness the opportunities offered by digital technologies during this crisis, participants shared a concern to recognize and protect digital rights in particular around the areas of privacy and inclusion (Hariati, 2021). This can be interpreted as internet users in Indonesia belongs to the category of digital natives' group (Gunawan, 2020). The use of digital technology worldwide is increasing, especially since the COVID-19 pandemic in early 2020 (Yugo, 2021). Digital technology that is currently widely applied is the interactive "SmartSignPlay" mobile application which is very helpful in learning sign language (American Sign Language) (Chuan, et al., 2016). Sibi Dyah Novialassafitri (2021) emphasizes the importance of strengthening the student literacy in inclusive classes.

This study aims to strengthen the students' literacy skills in inclusive classes through the development of an augmented reality book of folktales from North Sumatra. We all know that folktale is a cultural and historical wealth owned by a particular region. Generally, a folktale tells about an incident in a place or the origin of a place. The characters appear in folktales are generally manifested in the form of animals, humans or gods. *The legend of Lake Toba, the origin of Sawah Lunto* and *Malin Kundang* are some of the folk tales originating from the Sumatra Island. Besides as an entertainment, the function of folktales can also be used as a role model, especially those that contains messages of moral education. Semi (2002) explains that folktale is something that is considered as wealth belonging to the people whose presence is based on the desire to have social relations with other people. In folktales, it can be seen that there are various language actions, in order to display the values in society.

Augmented Reality is a combination of real and virtual objects in a real environment, running interactively in real time, and there is integration between the objects in three dimensions, they are virtual objects integrated in the real world. Surely, such technology is very helpful in terms of introducing culture and assisting in the implementation of teaching. The existence of a folktales book by utilizing Augmented reality and Android technology is expected to attract the attention of the community, especially children, in order to get to know the folktales of the archipelago, and can maximize the process of receiving information for children in the book. One of the special concerns in teaching and introducing culture is the inclusion class or better known as the class for children with special needs (ABK). The children with special needs (ABK) who have special characteristics are different from other children in common. Because of the characteristics and barriers, they have, the children with special needs special education services that are tailored to their abilities and potential. They need special services in education, so that learning barriers can be minimized and their needs can be met. The current government has provided support and development for inclusive education, especially with the establishment of special schools, but the available facilities, especially learning facilities which are still very lacking.

The learning process so far still uses books or modules, especially for children with special needs in teaching culture or knowledge. This should require technology developers to create new applications to make it easier to understand the information provided by teachers, and it would be very interesting if developing technology could be used in the world of education both formally and informally, especially when it is applied to a class of children with special needs. The multimedia-type applications, which can provide easy-to-understand information so that it will be easier to understand learning information, of course, are very useful for teaching in inclusive classes.

Research conducted by Nazaruddin in *The Book of Pop-Up Augmented Reality to Increase Focus and Object Recognition Capabilities for Children with Autism* states that AR can be used for learning for children with autism. In this study, the ABK studied were children with mental retardation (intelligence disorders and levels of adaptation to the surrounding environment). This study aims to provide alternatives and enrichment of multimedia-based learning media.

II. Review of Literatures

The state of art in this study was taken from several previous studies as a guide for the researcher which will then become a reference and comparison in conducting this research. In this state of art, there are several articles published in reputable international journals.

Susanne Schwab, Umesh Sharma & Lisa Hoffmann (2022) in which their study examined high school students' perceptions of the use of inclusive teaching practices by subject teachers who are part of the general class. The main objective was to report on the psychometric properties of a newly developed questionnaire that measures students' perceptions of inclusive teaching practices by their teachers. According to the students' perceptions, all subject teachers used some inclusive but not very inclusive practices. Joanna Tai, Rola Ajjawi & Anastasiya Umarova (2021) in their study attempted to examine the design of inclusive classroom assessments. A critical literature review was to identify 13 research papers, in which the results of an inclusive assessment were reported. Karim Del Rocio Garzon Diaz & Dan Goodley (2021) conducted a research related to the strategy to improve the knowledge of the students with disability.

The Augmented Reality (AR) is a technology that combines two-dimensional and or three-dimensional virtual objects into a real environment and then projects these virtual objects in real time. The virtual objects display the information that cannot be directly received by humans. This makes the augmented reality useful as a tool to help the users perceive and interact with the real world. The information displayed by virtual objects helps them to carry out activities in the real world.

Several devices used in Augmented Reality technology are 1) Marker. It is a real object that is used as a liaison between the real and virtual worlds and as a tool to interact with the system (Mark Fiala. Artag, 2005). Marker is a pattern that is made in the form of an image and printed with a printer machine that will be recognized by the camera device. The simplest marker that works very well is the matrix marker. The matrix marker uses a simple 2D barcode object that is used to recognize an object and to determine the relationship between the camera position and the marker. 2) Head Mounted Display (HMD). It is a camera device used in AR and there are two types of head mounted display devices, they are a) Opaque HMD. It is a tool that allows users to see virtual objects by closing one eye to get a virtual image captured by the camera based on the recording; b) See-Through HMD. It is a tool that allows us to see virtual objects directly with our two eyes because the virtual objects are directly displayed on the screen.

Folktale as part of literary works also has elements that are intertwined, thus supporting the overall story. Danandjaja (2002:4) argued that folktale has several characteristics and identification forms as follows: 1) Dissemination and inheritance which are usually carried out orally, spread through word of mouth or with an example accompanied by gestures and reminders. 2) Folktale exists in versions and even different variants. 3) Folktale is traditional, that is, it is distributed in a relatively fixed form or in a standard form, and is distributed among certain collectives for a long period of time (at least two generations). 4) Folktale is anonymous, that is, the name of the creator is no

longer known, it can be concluded that folktales have become the property of the supporting community. 5) Folktale usually has a formulaic or patterned form that uses cliché words, traditional expressions, repetitions and has standard bookkeeping. This style is behind the cult of the events and main characters. 6) Folktale has uses in collective life, namely as a means of education, solace, social protest, and projection of hidden desires.

The inclusive Education is a form of education that unites the children with special needs with normal children in general to learn. According to Hildegun Olsen (Tarmansyah, 2007; 82), inclusive education is that schools must accommodate all children regardless of physical, intellectual, social emotional, linguistic or other conditions. The essence of inclusive education is the human right to education. A logical consequence of this right is that all children have the right to receive education that does not discriminate against disability, ethnicity, religion, language, gender, ability and others. Practical goals to be achieved in inclusive education include the direct goals by children, teachers, parents and the community.

The characteristics in inclusive education are incorporated in several things such as relationships, abilities, seating arrangements, learning materials, resources and evaluations which are explained as follows: 1) Friendly and warm relationships, for examples for deaf children: the teacher is always nearby with his face directed at the child and smile. Class assistants (parents) praise deaf children and help others; 2) the ability of teachers, students with different backgrounds and abilities and parents as companions; 3) The seating arrangements. It is varied seating arrangements such as sitting in groups on the floor in a circle or sitting on benches together so they can see each other; 4) The learning materials of various materials that vary for all subjects.

III. Research Methods

The success indicators in this study include the availability of literacy teaching materials based on augmented reality North Sumatran folktales. To achieve these indicators, then the method used in this research is ADDIE (Analysis-Design-Develop-Implement Evaluate) model. One of the functions of ADDIE is as a guide in building training program tools and infrastructure that is effective, dynamic and supports the performance of the training itself. This model uses 5 development stages, they are analysis, design, development, implementation evaluation. This article describes the stages of preliminary study, planning, product development, and model review.

IV. Discussion

The Design of Teaching Materials Development of North Sumatran Folktales for Inclusive Class

Below describes the design for developing North Sumatran folktales teaching materials for the inclusive class. The developed folktales are well-known North Sumatran folktales, such as *The Legend of Lau Kawar, Gundaling,* and others. Each of these folktales is packaged into a series of illustrated comic stories. At the design stage, the focus is on creating a system that is easy to use and understandable by the user.

Next, on functional model of software describes the general description of the software. Starting from making 3-dimensional objects, making sound files, searching and forming images so that they become marker libraries. They are combined into one augmented reality project plus an AR (augmented reality) library and the coding process which is the main component of augmented reality software development.

Before designing the application, first folktales comics were prepared to be displayed in the application. A 2-dimensional folktales comic image can be seen in the following figure.
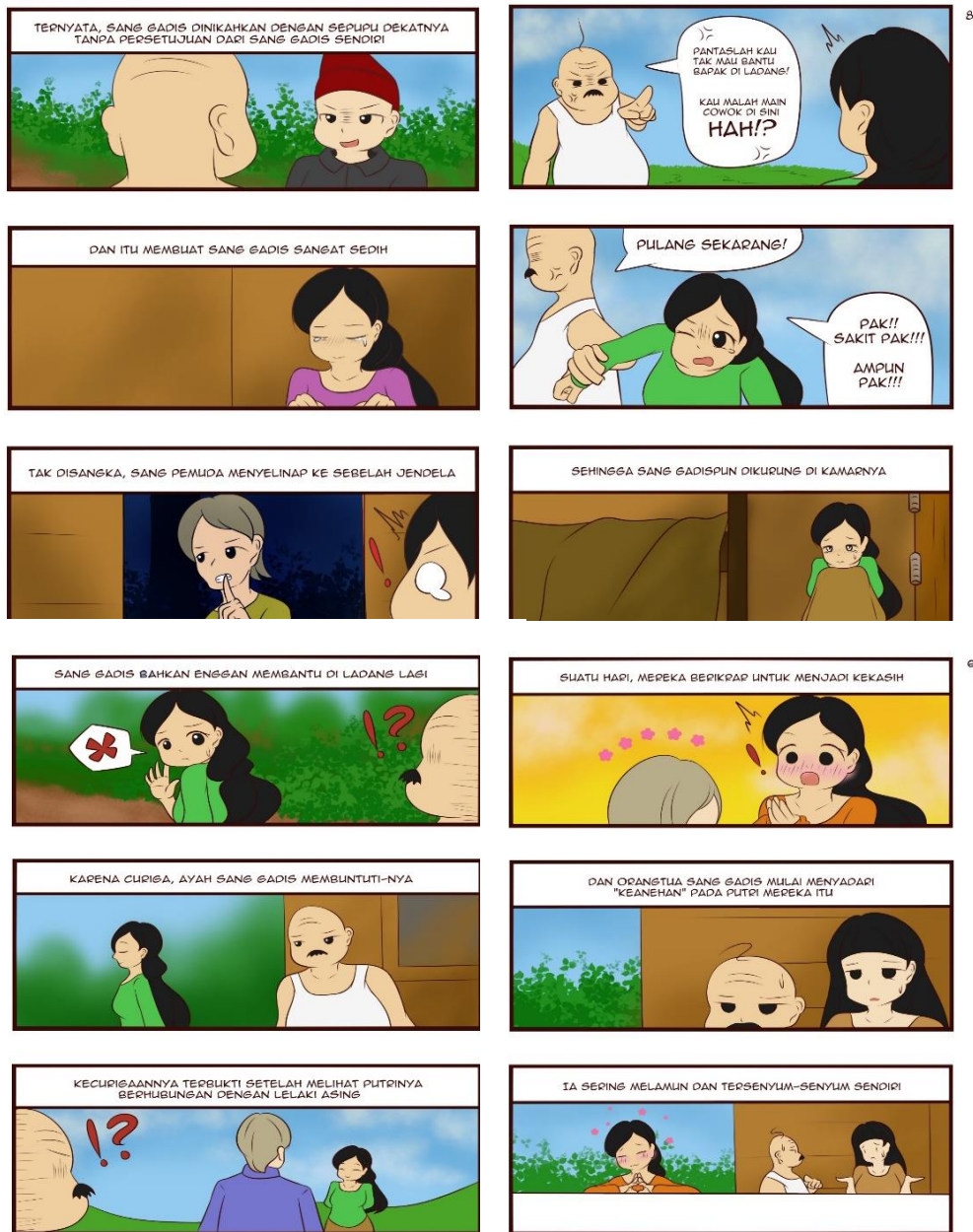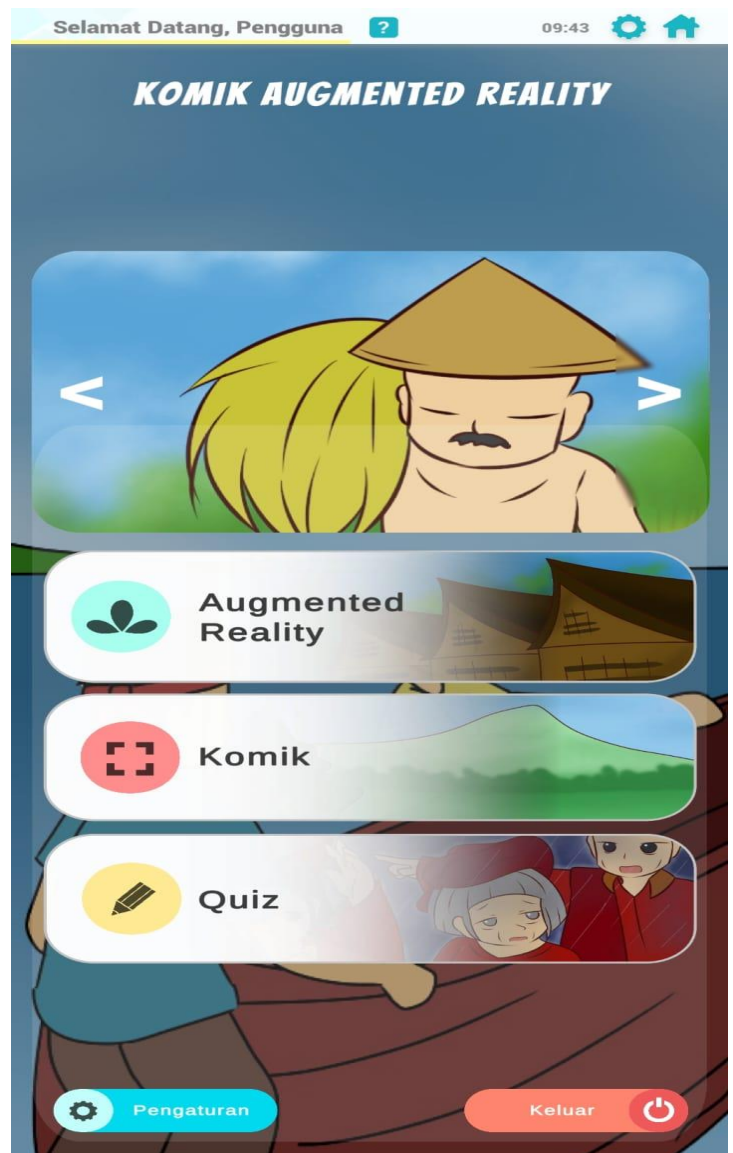

Next is the design of the application by using the software unit. The following is a screenshot of the development results.

V. Conclusion

The conclusions that can be drawn are that the development of North Sumatran folktales was carried out at the stage of converting the story text into the form of illustrated comics. Then, the teaching materials for inclusive students were prepared as shown in the previous picture. This augmented reality-based teaching material application can be downloaded at https://qamirai.com/application-komik-augmented-reality-ar-interaktif/.

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